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NEW NEOTROPICAL INSECTS OF THE APTERYGOTAN  
FAMILY JAPYGIDAE

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THE new species of Japygidae described in this paper represent those found while the writers were working up the exotic material in the collection of the United States National Museum. Most of this material was in good condition, and the descriptions here given were made almost exclusively from mounted specimens stained with acid fuchsin. In addition to the usual taxonomic treatment, notes have been added on the nature of food taken (victims eaten) by these predators, and in the case of one species a description is given of the musculature of the proximal part of the antenna.

All the species here described have in common a type of antenna peculiar to certain genera. It is described as follows: Antenna long, extending backward over much of the thorax and composed of a large and individually varying number of segments; segment IV broadest, with each succeeding segment progressively reduced in diameter; setae of each segment of varying length. Also in each species the legs are progressively longer from the first to the last. However, leg II may be but very slightly longer than leg I, while leg III may be much longer than II. Like most tropical japygids, those here described are from moderate to large size.

*EVALLJAPYX DURICAUDA*, new species

PLATE 33, FIGURE 1

*Description.*—Head with lateral margins almost straight for most of their length but strongly curved near base. Antenna consisting of

22 segments; segment I longer than broad; segment II shorter than I and with axis slightly outcurved; segment III slightly longer than II and broadest near distal margin. Antenna with setae on the more distal segments partly arranged in two or three transverse rows. Distal tooth of mandible much larger than the other three, which graduate in length, the most nearly medial being the smallest. Outer lamina of inner lobe of maxilla not pectinate, slender and curved, the other laminae pectinate.

Pronotum well supplied with setae of varying lengths. Mesonotum divided near its anterior end by a curved transverse suture in front of which are five setae, two being large and robust; the remainder of the mesonotum and the metanotum richly beset with setae of varying lengths. Tarsi each terminated by two subequal lateral claws and a vestigial median claw.

Abdomen with first six terga subequal; each with a transverse line near its anterior end, in front of which are a variable number of small setae. Sterna richly provided with small setae. Subcoxal organs of segment I each bearing a row of five subequal long setae and a number of hairlike microsetae. Styli similar, subequal, each with a subbasal small seta. Segment VII not so broad as VI, much more heavily sclerotized but with fewer setae. Segment VIII narrower than VII, more than twice as long as IX. Chaetotaxy of segment X and chaetotaxy and dental armature of forceps as shown in plate 33, figure 1.

Length of body, including forceps, 7.0 mm.; width (that of segment III of abdomen), 0.6 mm.

*Type locality*.—San José de Pinula, Guatemala.

*Type (holotype)*.—U.S.N.M. No. 55213.

*Remarks*.—Description based on a single adult specimen taken at the type locality in May 1924 by Wm. M. Mann.

This species is similar to *E. bruneri* Silvestri but may be readily separated from it by the dental armature of the forceps and by the number of antennal segments.

EVALLJAPYX MANNI, new species

PLATE 33, FIGURE 3

*Description*.—Head with lateral margins almost straight for most of their length but strongly curved near base. Antenna long, number of segments 32; segment I longer than broad; segment II shorter than I and with axis slightly outcurved; segment III about as long as II and broadest near distal margin. All antennal segments well clothed with hairlike setae, those on the more distal segments arranged in several irregular rows. Distal tooth of mandible much larger than the other three; two proximal teeth united at base and

together forming a broad curved tooth. Outer lamina of inner lobe of maxilla not pectinate, long and slender, the other laminae pectinate.

Pronotum well supplied with setae of varying lengths. Mesonotum divided near its anterior end by a curved transverse suture in front of which is a single pair of setae, the remainder of the mesonotum and the metanotum richly beset with setae of varying lengths. Tarsi each terminated by two subequal lateral claws and a vestigial median claw.

Abdomen with first six terga and sterna essentially as in the previously described species. Subcoxal organs of segment I each with a row of about 30 setae. Abdominal segments VII, VIII, and IX as in the previously described species. Chaetotaxy of segment X and chaetotaxy and dental armature of forceps as shown in figure 3.

Length of body, including forceps, about 11 mm.; width (that of segment III of abdomen), 1.3 mm.

*Type locality*.—Estrella Valley, Costa Rica.

*Type (holotype)*.—U.S.N.M. No. 55214.

*Remarks*.—Description based on a single adult taken at type locality, April 1924, by Wm. M. Mann.

This species superficially resembles *E. crassicauda* Silvestri, from which it may be readily distinguished by the dental armature of the forceps.

CATAJAPYX NEOTROPICALIS, new species

PLATE 33, FIGURE 2

*Description*.—Head with lateral margins strongly curved. Antenna consisting of 30 segments; segment I broader than long; segment II longer than I and strongly outcurved; segment III about as long as II and broadest near distal margin. Setae of antenna on the more distal segments partially arranged in one or two rows per segment. Mandible possessing five teeth, the distal larger than the others, the proximal smallest and broadest, almost triangular. Outer lamina of inner lobe of maxilla not pectinate but armed distally with two to several processes, other laminae pectinate.

Pronotum with a well-developed median apodeme and well supplied with setae of varying lengths. Mesonota and metanota also richly provided with setae. Tarsi each terminated by two unequal lateral claws and a small, slender, acuminate, weakly sclerotized, median claw.

Abdominal terga I through VI subequal, well supplied with setae, abdominal segment VII wider than VI and more heavily sclerotized; segment VIII not so broad as VII, less than twice as long as IX. Abdominal sternum I with a broad area of what seem to be sense setae on each side. Subcoxal organ not sufficiently distinct in the

specimens available to be described. Styli long, each with a subbasal seta which is long and curved. Forceps somewhat variable in dental armature, those of the holotype illustrated in figure 2.

Length of body, including forceps, about 7 mm.; width (that of segment III of abdomen), 0.7 mm.

*Type locality*.—Barro Colorado Island, Panama.

*Type (holotype)*.—U.S.N.M. No. 55215.

*Remarks*.—Description based on the following four specimens: One adult (holotype) taken July 19, 1938, by E. C. Williams at the type locality; one adult (paratype) taken at Porto Bello, Panama, by E. A. Schwarz; one adult (paratype) taken at Bobas, Guatemala, in May by W. M. Mann; one adult (paratype) taken at Navarro, Costa Rica, in March by W. M. Mann.

METAJAPYX SCHWARZI, new species

PLATE 34, FIGURE 4

*Description*.—Head with lateral margins strongly curved posteriorly. Antenna with 36 to 38 segments; segment I considerably broader than long; segment II longer than I and with axis strongly outcurved; segment III as long as II and slightly broader, with straight axis. The antennal setae on the more distal segments partly arranged in two or three transverse rows. Each mandible bearing four teeth, the most distal of which is larger than the three others, which are subequal. Outer lamina of inner lobe of maxilla long, curved, and without teeth, other laminae strongly curved, flattened, and pectinate.

Pronotum but slightly longer than broad, bearing about 24 setae, two pairs of which are situated near middle of lateral margins. Mesonotum divided near its anterior end by a curved transverse suture, in front of which is situated a single pair of straight, submedian setae. Metanotum similar to mesonotum but slightly longer and broader. Tarsi each terminated by two unequal, lateral claws and a vestigial median claw.

Abdomen with first seven terga subequal; each with a transverse line near its anterior end, in front of which there are no setae and each divided also by a hyaline, median groove. Sterna II to VII likewise each with a transverse line near its anterior end, but without the median groove. Subcoxal organs of segment I each bearing a row of small, short, subequal setae and median glandular organ of same segment with a large number of circular, dome-shaped, unequal, contiguous disculi. Styli similar, subequal, each without subbasal spur but with a single seta which is curved and ventrolateral. Segments VIII and IX shorter than the others and each strongly bilobed anterolaterally. Segment IX much shorter than VIII and with a single pair of curved lateral setae and a dorsal, posterior, marginal row of

six microsetae. Segment X dorsally forming a square and bearing several conspicuous, curved setae. Right arm of forceps much broader toward its base than left arm, but distally narrower and more strongly curved; proximal half of right arm with four teeth, the first three of which are subequal and smaller than the fourth, and all of which are hyaline apically; distal half of right arm with five or six very low vestiges of teeth. Left arm of forceps slender throughout, basal three-fourths with a row of very low, flat, subequal teeth, and distal to them a large tooth with a hyaline apex.

Length of body, including forceps, 8.0 mm.; width (that of segment III of abdomen), 0.9 mm.

*Type locality*.—Livingston, Guatemala.

*Type (holotype)*.—U.S.N.M. No. 55216.

*Remarks*.—Description based on the following: One adult (holotype) taken October 5, 1905, by E. A. Schwarz and H. S. Barber and two adults taken at Lombardia, Honduras, 1924, by W. M. Mann.

In the rectum of the holotype specimen are the remains of some small pterygotan insect. According to W. H. Anderson, of the Bureau of Entomology and Plant Quarantine, they probably represent those of a coleopterous larva of the family Staphylinidae.

The genus *Metajapyx* is not well differentiated from *Japyx*, since the species of the two intergrade. Further study may lead to its suppression.

#### MIXOJAPYX COOKI, new species

#### PLATE 34, FIGURES 5, 6

*Description*.—Head with lateral margins almost straight for most of their length but strongly curved near base. Antenna very long, number of segments 44 or 45; segment I broader than long; segment II slightly longer than I and with axis slightly outcurved; segment III as long as II and broadest near distal margin. All antennal segments well clothed with hairlike setae which do not form rows; as the size of the segments becomes smaller, their setae likewise become finer and shorter. Distal tooth of mandible much larger than the other three; two proximal teeth united at base and together forming a lobe, demarcated by a suture from the remaining part of the mandible. Outer lamina of inner lobe of maxilla pectinate and similar to the other laminae.

Pronotum with a well-developed median apodeme and well supplied with setae of varying lengths. Mesonotum with the distinct, movable prescutum typical of the genus. The latter bears over 50 setae of varying sizes and lengths. Scutum with sublateral apodemes straight and slightly converging posteriorly. Metanotum similar to mesonotum but slightly larger and not so well sclerotized. Thoracic spiracles

large, conspicuous. Tarsi each terminated by two unequal, lateral claws and a vestigial median claw. Each lateral claw bears a poorly formed basal tooth, not easily seen in some of the tarsi.

Abdomen with terga II to VI subequal, each having a hyaline median groove and a transverse line near its anterior end, in front of which are a few microsetae but no setae. Segment VII of abdomen broader than VI, more heavily sclerotized and with posterior angular lobes more conspicuous; segment VIII not so broad as VII but better sclerotized, segment IX of usual shape, and X longer than broad and with lateral margins almost straight. Forceps heavily pigmented and sclerotized; basal three-fifths of left arm provided with two rows of five or six irregularly placed teeth. For other characters of forceps see figure 6. Subcoxal organs of segment I each with a fringe of short, subequal setae, behind which is a row of sensory pits; median glandular organ (pl. 3 $\pm$ , fig. 5) large, conspicuous, with convex posterior margin and over 100 spherical, tuberclelike disculi, many of which are contiguous. Styli each with curved ventrolateral seta and some with a poorly developed basal spur.

Length of body, including forceps, 24.0 mm.; width (that of segment III of abdomen), 3.2 mm.

*Type locality*.—"Tactic, St. Rosa," Guatemala.

*Type (holotype)*.—U.S.N.M. No. 55217.

*Remarks*.—Description based on three adults taken at type locality, June 1904, by O. F. Cook. In the rectum of one of these specimens are the undigested remains of an insect which W. H. Anderson identified as some coleopterous larva, probably a species of Carabidae.

MIXOJAPYX BARBERI, new species

PLATE 34, FIGURES 7, 8

*Description*.—Head with lateral margins moderately outcurved. Antenna of moderate length, number of segments 40 to 46, but usually 42; segment I broader than long; segment II slightly longer than I and with axis very slightly outcurved; segment III about as long as II and broadest apically; segment IV subequal to III but with posterior margin distinctly curved. All antennal segments well clothed with thin setae of varying lengths which do not form rows. Distal tooth of mandible much the largest of the four; two proximal teeth united at base forming a lobe, demarcated from the remaining part of mandible. Outer lamina of inner lobe of maxilla long, slender, curved, without teeth.

Pronotum with a well-developed median apodeme and well supplied with setae of varying lengths, some being but little larger than microsetae. Mesonotum with the typically distinct, movable prescu-

tum, the latter bearing many setae of varying lengths. Metanotum similar to mesonotum but slightly larger. All four pairs of thoracic spiracles present, but only the first pair large and conspicuous. Tarsi each terminated by two slightly unequal lateral claws and a minute median claw, which is easily overlooked.

Abdomen with terga II to VII subequal, each having a hyaline median groove and a transverse line near its anterior end, in front of which are a few microsetae. Segment VII of abdomen equal in width to VI but more heavily sclerotized and with more conspicuous posterior angular lobes; segment VIII not so broad as VII but more heavily sclerotized; segment IX of usual shape and X dorsally about as broad as long. Subcoxal organs of segment I each with a fringe of short, subequal setae, but with no microsetae; median gland large and possessing many disculi (pl. 34, fig. 7) which are unusual in that they are angulate instead of circular and so completely contiguous that they occupy all the surface of the gland. Styli each with a poorly developed basal spur and a single, conspicuous, curved seta. Forceps heavily pigmented and sclerotized; basal three-fifths of left arm provided with two rows of similar teeth, the lower of which is not seen from above and hence not shown in figure 8.

Length of body, including forceps, 12.3 mm.; width (that of segment III of abdomen), 1.7 mm.

*Type locality*.—Cacao, Guatemala.

*Type (holotype)*.—U.S.N.M. No. 55218.

*Remarks*.—Material at hand as follows: Three specimens from type locality, March 1906, by E. A. Schwarz and H. S. Barber; three specimens (two young) from type locality, March 25, 1906, same collectors; three specimens, "Cacao, Trece Aguas, Alta Verapaz, Guatemala IV," March 27-29, 1906, same collectors; one specimen from type locality April 1906, same collectors; one specimen from Purulha, Guatemala, May 5, 1906, "D. F. C."

Three of these Guatemalan japygids have chitinous remains of arthropods in the alimentary canal. In the rectum of the single specimen taken at Purulha is the head of a dipterous insect, which probably is that of a fungous gnat (Mycetophilidae) according to A. Stone, of the Bureau of Entomology and Plant Quarantine. In the rectum of an adult specimen taken at Cacao, March 27-29, 1906, are the remains of some very small, heavily sclerotized insect, the largest piece of which appears to be a part of the thorax of a beetle. In another specimen, taken at Cacao, March 1906, there are the remains of two arthropods in the alimentary canal. In the anterior part of the canal, scattered along in the thoracic part, are the legs and the cephalothorax of a beetle mite (Oribatoidea) while in the rectum are the remains of an insect one piece of which is the last tarsal segment of a leg with two equal claws and a pulvillus.

## NEOJAPYX TROPICALIS, new species

## PLATE 34, FIGURES 9, 10

*Description.*—Head with lateral margins almost straight and parallel. Antenna somewhat more than twice as long as head, number of segments 34 to 36; segment I about twice as broad as long; segment II with axis moderately outcurved; segment III slightly shorter than IV and not so broad. All antennal segments well provided with straight, or almost straight, setae which do not form rows. Mandible with distal tooth long, curved, sharp.

Pronotum with well-developed median apodeme and well supplied with setae of varying lengths. Mesonotum with a large, distinct, movable prescutum, the latter bearing several setae including a conspicuous pair of stout, straight, submedian setae situated at the junction of the median apodeme with the posterior, marginal apodeme. Metanotum larger than mesonotum and not so strongly sclerotized; prescutum without median apodeme and with a pair of stout, straight, submedian setae situated farther from posterior margin. First three pairs of thoracic spiracles visible; the other pair may be present but not detectable in the unstained specimen at hand. Tarsi each terminated by two very unequal, lateral claws and a minute median claw. Each lateral claw bears a somewhat indistinct basal tooth.

Abdomen with terga II to VI subequal, each having a transverse line near its anterior end, in front of which there appear to be no setae. Segment VII of abdomen intermediate in width between VI and VIII; segment VIII with sides almost parallel and bearing several conspicuous setae near posterior border; segment IX of the usual shape and bearing dorsally several small to minute setae. Subcoxal organs of segment I each with a fringe of subequal setae which are not arranged in a definite row. Styli each with a poorly developed basal spur and a single curved seta. Forceps equal except that the left arm has two rows of teeth on the basal part, four teeth being in the upper and three in the lower row. For the other characters of the forceps see figure 10.

Length of body, including forceps, 7.6 mm.; width (that of segment III of abdomen), 0.8 mm.

*Type locality.*—Georgetown, British Guiana. "Quarantine at Philadelphia, Pa., on soil of potted palm."

*Type (holotype).*—U.S.N.M. No. 55219.

*Remarks.*—Description based on the holotype, the only specimen at hand, which was taken in June 1921, through the Government quarantine service.

The alimentary canal of the single specimen of this species is filled for most of its length with partially digested food material. In the



region of the eighth abdominal segment can be clearly detected the chelicerae and some other parts of a mite of the family Parasitidae.

The single specimen of *N. tropicalis* is of further interest because it has been prepared in such a way as to exhibit the musculature. Advantage is taken of this fact to record some observations on the muscles of the proximal part of the antenna. These notes supplement the descriptions and figure of the same part of the antenna of a species of *Japyx* already given by Imms.<sup>1</sup> In general the number and arrangement of the muscles (pl. 34, fig. 9) are the same as reported by Imms for *Japyx*, but the following should be noted:

Segments II and III appear to be articulated firmly in the manner of a hinge, there being an exceedingly short articulating membrane between the two. This condition prevents III being telescoped into II, and restricts the movement between the two segments to a single plane, which in this instance is vertical. Imms describes two muscles for segment II, a levator and a depressor. In the case of *N. tropicalis* it is not clear whether there is a single muscle with two heads or two distinct muscles as shown by Imms.

An examination of the structures illustrated in plate 34, figure 9 indicates rather conclusively that this large muscle in segment II is the same as the large, diagonal levator of III, which in turn must be the same as the smaller and less diagonal levator of IV, which is undoubtedly the same as the longitudinal levator muscle found in each succeeding segment. Thus this same muscle, found in the segments beyond the first, retains almost without change its place of insertion and its function, while its origin shifts from the anterobasal to the posterobasal region of the segment in which it occurs.

In segment I there is a very interesting muscle, since its origin is from almost a single point, while it is spread out like a fan at its place of insertion. Concerning it Imms states, "The functions of this muscle are not wholly clear." In *Japyx*, according to Imms, "some of its fibres are inserted onto the base of segment II \* \* \*." He also states that the origin of the muscle is on the border of the scape. In *N. tropicalis* the insertion of this muscle is entirely on the anterodorsal aspect of segment I and its origin from the sclerotized and elevated ring of the head capsule to which the base of the antenna is articulated. Its function in the case of this species is clear, i. e., it retracts and turns inward segment I.

<sup>1</sup> Quart. Journ. Micros. Soc., vol 81, pt. 2, p. 280, 1939.